

REMARKS

The Office Action dated August 11, 2004 indicated that the declaration required correction as missing the second inventor's signature. However, the present application has only a single inventor, Mark L. DiOrio, as indicated on the signed declaration submitted on March 26, 2004 with a response to the notice of missing parts. Accordingly, Applicant requests reconsideration and withdrawal of the requirement that the declaration be corrected.

Claims 1-21 were pending in the above-identified application when last examined and are amended as indicated above. The claim amendments clarify the claim language and are not intended to limit the scope of the claims.

Claims 1 and 11 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Pat. No. 6,426,639 (Farnworth). Applicant respectfully traverses the rejection.

Independent claim 1 distinguishes over Farnworth at least by reciting, "A process for testing a package containing a device." Farnworth is directed to testing of a semiconductor die and fails to disclose use of such methods for testing of packages.

Claim 1 further distinguishes over Farnworth by reciting, "using the probe tips to inelastically deform the external terminals to improve planarity of the external terminals."

Farnworth discloses a test apparatus 10 that uses capacitive couplings for variable signals and electrical contact for constant signals. For example, Fig. 7, which the Examiner cites in the rejection, illustrates a test apparatus 10 including a substrate 20 with test terminals 60. Some test terminals 60 have a dielectric coating 24 that allows capacitive coupling to corresponding die terminals 70a for transmission of a variable signal, and other test terminals 60 have the dielectric coating 24 removed to allow direct electrical connection to other die terminals 70a for transmission of a constant signal.

Farnworth does not suggest probing that can condition terminals, and Farnworth particularly fails to suggest deformations that improve planarity. To the contrary, removal of dielectric from test terminals 60 can create terminals of different heights. This height difference appears to teach against improving planarity since the tops of probes themselves are apparently not in a plane.

Farnworth further provides no indication that the deformations during probing would be inelastic and thus create a lasting improvement or change in planarity. Farnworth at

column 11, line 67, states, "The die terminals 70a may have an oxide coating 78 which covers the bond pads and deforms when the flip chip 40a is engaged with the substrate 20. The oxide coating 78 generally deforms sufficiently to create a conductive electrical connection between the die terminals 70a and the test terminals 60 against which they press." Farnworth describes deformation for electrical contact but fails to disclose or suggest that the deformation is inelastic or improves planarity. Accordingly, claim 1 is patentable over Farnworth.

Claim 11 depends from claim 1 and is patentable over Farnworth for at least the same reasons that claim 1 is patentable over Farnworth.

For the above reasons, Applicant requests reconsideration and withdrawal of the rejection under 35 U.S.C. § 102.

Claim 12 was rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Pat. No. 5,055,778 (Okubo). Applicant respectfully traverses the rejection.

Independent claim 12 distinguishes over Okubo at least by reciting, "the printed circuit board includes a set of contact pads having a pattern that matches elevated terminals on a package containing a device." In contrast, Okubo is directed to a probe card that "is incorporated into probing equipment to test finished IC chips." See the Abstract of Okubo. Okubo fails to disclose or suggest use of IC probing techniques on device packages.

Further, Okubo fails to disclose or suggest a circuit board with contact pads having a pattern that matches external terminals on a package. Okubo describes that "Starting at the arrangement shown in FIG. 1, ... the board 10 is moved toward ... the IC chip 60 so that the probe front ends 32 will make respective contacts with the bumps 611." Fig. 1 of Okubo shows that the front ends 32 of probes 30 can be aligned with bumps 611. However, the front ends 32 of probes 30 are clearly not on a surface of a printed circuit board, and Okubo fails to indicate or suggest that printed circuits 12 or solder 331 have a pattern that matches external terminals on a package being tested.

For the above reasons, Applicant requests reconsideration and withdrawal of this rejection under 35 U.S.C. § 102.

Claims 1-4, 6, 10, 16, 18, and 21 were rejected under 35 U.S.C. § 103(a) as unpatentable over Farnworth in view of U.S. Patent No. 5,604,446 (Sano). Applicant respectfully traverses the rejection.

Independent claim 1 is patentable over Farnworth for the reasons given above. In particular, Farnworth fails to suggest package testing and fails to suggest using the probe tips to inelastically deform and improve the planarity of the external terminals of a package.

Sano is directed to a probe apparatus for a semiconductor wafer. Accordingly, Sano and Farnworth when considered separately or in combination fail to suggest a "process for testing a package containing a device" as recited in claim 1.

Further, the combination of Farnworth and Sano fails to suggest "using the probe tips to inelastically deform the external terminals to improve planarity of the external terminals." The Examiner cites Sano for teaching an electrical testing apparatus. However, Sano like Farnworth fails to suggest inelastic deformation of terminals or improving planarity during testing. Accordingly, claim 1 is patentable over the combination of Farnworth and Sano.

Claims 2-4, 6, and 10 depend from claim 1 and are patentable over Farnworth and Sano for at least the same reasons that claim 1 is patentable over Farnworth and Sano.

Independent claim 16 distinguishes over the combination of Farnworth and Sano at least by reciting, "A package testing system comprising: ... a mechanism capable of pressing external terminals of a package against the probe tips with sufficient force to inelastically deform the external terminals."

As discussed above, Farnworth and Sano are directed to probing systems for semiconductor dice or wafers, and the combination of Farnworth and Sano fails to suggest a package testing system as recited in claim 16.

Further, neither Farnworth nor Sano suggest, "pressing external terminals of a package against the probe tips with sufficient force to inelastically deform the external terminals." Accordingly, the combination of Farnworth and Sano fails to suggest a mechanism as recited in claim 16. Claim 16 is thus patentable over the combination of Farnworth and Sano.

Claims 18 and 21 depend from claim 16 and are patentable over the combination of Farnworth and Sano for at least the same reasons that claim 16 is patentable over the combination of Farnworth and Sano.

For the above reasons, Applicant requests reconsideration and withdrawal of this rejection under 35 U.S.C. § 103.

Claims 5 and 17 were rejected under 35 U.S.C. § 103(a) as unpatentable over Farnworth. Applicant respectfully traverses the rejection.

Claims 5 and 17 respectively depend from claims 1 and 16 and are therefore patentable over Farnworth for at least the reasons given above to show that claims 1 and 16 are patentable over Farnworth.

For the above reasons, Applicant requests reconsideration and withdrawal of this rejection under 35 U.S.C. § 103.

Claims 7-9, 19, and 20 were rejected under 35 U.S.C. § 103(a) as unpatentable over Farnworth in view of Sano and further in view of Okubo. Applicant respectfully traverses the rejection.

Claims 7-9 depend from claim 1 and are patentable over the combination of Farnworth, Sano, and Okubo at least for the reasons that claim 1 is patentable over the combination. In particular, Farnworth, Sano, and Okubo separately and in combination fail to disclose or suggest "using the probe tips to inelastically deform the external terminals to improve planarity of the external terminals" as recited in claim 1.

Claims 19 and 20 depend from claim 16 and are patentable over the combination of Farnworth, Sano, and Okubo at least for the reasons that claim 16 is patentable over the combination. In particular, Farnworth, Sano, and Okubo separately and in combination fail to disclose or suggest, "A package testing system comprising: ... a mechanism capable of pressing external terminals of a package against the probe tips with sufficient force to inelastically deform the external terminals" as recited in claim 16.

For the above reasons, Applicant requests reconsideration and withdrawal of this rejection under 35 U.S.C. § 103.

Claims 13-15 were rejected under 35 U.S.C. § 103(a) as unpatentable over Okubo in view of Sano. Applicant respectfully traverses the rejection.

Claims 13-15 depend from claim 12, which is patentable over Okubo as indicated above because Okubo fails to disclose or suggest, "the printed circuit board includes a set of contact pads having a pattern that matches elevated terminals on a package containing a device."

Sano discloses a probe mechanism that has "A main region 27 in which a great number of contact elements 28 connected to the print circuit 23 and made of gold, gold-alloy or the like, is formed at the center of the lower surface of the membrane 22." See column 5, lines 36-39 and Fig. 4 of Sano. Sano thus teaches contact elements 28 on a flexible

membrane 22, not on a printed circuit board. Claim 12 is thus patentable over the combination of Okubo and Sano at least because neither Okubo nor Sano discloses or suggests that "the printed circuit board includes a set of contact pads having a pattern that matches elevated terminals on a package containing a device."

Claim 13-15 depend from claim 12 and are patentable over the combination of Okubo and Sano for at least the same reasons that claim 11 is patentable over the combination of Okubo and Sano.

For the above reasons, Applicant requests reconsideration and withdrawal of this rejection under 35 U.S.C. § 103.

Claims 22-27 are added. New claims 22 and 23, 24 and 25, and 26 and 27 respectively depend from claims 16, 1, and 12 and are in condition for allowance for at least the same reasons as their respective base claims.

In summary, claims 1-21 were pending in the application. This response amends claims 1 and adds claims 22-27. For the above reasons, Applicants respectfully request allowance of the application including claims 1-27.

Please contact the undersigned attorney at (408) 927-6700 if there are any questions concerning the application or this document.

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Respectfully submitted,



David Millers
Reg. No. 37,396